Question	Answer	Marks	Guidance
8(c)	$(AC^2) = r^2 + 0.25r^2 - (2 \times r \times 0.5r \cos(\pi - 1.45))$	**M1**	For correct substitution in cosine rule using $(\pi -$ *their* $1.45)$
	$AC = 1.17r$	**A1**	
	Perimeter = $2.95r + 1.17r$	**B1**	**FT** on *their AC*
	$r = 2.91$	**A1**	
9(a)	$\overrightarrow{AB} = \mathbf{b} - \mathbf{a}$ or $\overrightarrow{BA} = \mathbf{a} - \mathbf{b}$	**B1**	
	$\overrightarrow{OX} = \mathbf{a} + \frac{3}{4}\overrightarrow{AB}$ or $\overrightarrow{OX} = \mathbf{b} + \frac{1}{4}\overrightarrow{BA}$ $\overrightarrow{OX} = \mathbf{a} + \frac{3}{4}(\mathbf{b} - \mathbf{a})$ or $\overrightarrow{OX} = \mathbf{b} + \frac{1}{4}(\mathbf{a} - \mathbf{b})$	**M1**	For correct use of ratio, using *their* $\overrightarrow{AB}$ or $\overrightarrow{BA}$
	$\overrightarrow{OX} = \frac{\mathbf{a}}{4} + \frac{3}{4}\mathbf{b}$	**A1**	
9(b)	$\overrightarrow{AC} = 2\mathbf{b} - \mathbf{a}$	**B1**	
9(c)	$\overrightarrow{AY} = -\mathbf{a} + h\left(\frac{\mathbf{a}}{4} + \frac{3}{4}\mathbf{b}\right)$	**B1**	**FT** on *their* $\overrightarrow{OX}$
9(d)	$-\mathbf{a} + h\left(\frac{\mathbf{a}}{4} + \frac{3}{4}\mathbf{b}\right) = m(2\mathbf{b} - \mathbf{a})$	**M1**	For equating appropriate vectors and attempt to equate like vectors
	$-1 + \frac{h}{4} = -m$	**A1**	**FT** from *their* $\overrightarrow{AY}$ and $\overrightarrow{AC}$
	$\frac{3h}{4} = 2m$	**A1**	**FT** from *their* $\overrightarrow{AY}$ and $\overrightarrow{AC}$
	$h = \frac{8}{5}, \ m = \frac{3}{5}$	**A1**	For both
10(a)	$\frac{3x + 10 + 2(x+1)}{(x+1)(3x+10)} = \frac{3x + 10 + 2x + 2}{(x+1)(3x+10)}$ $= \frac{5x + 12}{3x^2 + 13x + 10}$	**B1**	For expansion and simplification to obtain given answer

Question	Answer	Marks	Guidance
10(b)	$P\left(0,\ \frac{6}{5}\right)$ and $Q\left(-\frac{6}{5},\ 0\right)$ oe	**B1**	
	Area of triangle = $\frac{18}{25}$ or 0.72	**B1**	
	Area under curve = $\int_0^2 \frac{1}{x+1}+\frac{2}{3x+10}\ \mathrm{d}x$	**M1**	For use of part **(a)** and attempt to integrate to obtain at least one ln term.
	$=\left[\ln(x+1)+\frac{2}{3}\ln(3x+10)\right]_0^2$	**2**	**B1** For $\ln(x+1)$ **B1** For $\frac{2}{3}\ln(3x+10)$
	$=\ln 3+\frac{2}{3}\ln 16-\frac{2}{3}\ln 10$	**M1**	For correct use of limits. Dep on previous M mark.
	$=\frac{2}{3}\ln 3\sqrt{3}+\frac{2}{3}\ln 16-\frac{2}{3}\ln 10$	**M1**	For use of $\ln 3=\frac{2}{3}\ln 3\sqrt{3}$
	$=\frac{2}{3}\ln 3\sqrt{3}+\frac{2}{3}\ln\left(\frac{16}{10}\right)=\frac{2}{3}\ln\left(\frac{48\sqrt{3}}{10}\right)$	**M1**	For use of multiplication and division rule
	Total area = $\frac{18}{25}+\frac{2}{3}\ln\left(\frac{24\sqrt{3}}{5}\right)$ oe	**A1**	For correct answer in the required form dep on the three preceding M marks Must not be obtained using a calculator
11(a)	$2\cos x=3\frac{\sin x}{\cos x}\ \Rightarrow 2\cos^2 x=3\sin x$	**M1**	For use of $\tan x=\frac{\sin x}{\cos x}$ and multiplying by $\cos x$
	$2\left(1-\sin^2 x\right)=3\sin x$	**M1**	For use of correct identity
	$2\sin^2 x+3\sin x-2=0$	**A1**	For correct rearrangement to obtain the given answer
	Alternative $2\sin^2 x+3\sin x-2$ $=2\left(1-\cos^2 x\right)+3\sin x-2$	**(M1)**	For use of correct identity
	$=-2\cos x\cos x+3\sin x$ $=-3\tan x\cos x+3\sin x$	**(M1)**	For use of $2\cos x=3\tan x$
	$-3\sin x+3\sin x=0$	**(A1)**	For use of $\tan x\cos x=\sin x$ and answer 0